



Kok, AAL, Huisman, M, Cooper, R ORCID logoORCID:
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RESEARCH ARTICLE

Lifetime trajectories of socio-economic adversity and their associations with psychosocial factors and attitudes towards social class

Almar A.L. Kok,¹ a.kok1@amsterdamumc.nl

VU Amsterdam, Department of Sociology, Netherlands

*Amsterdam UMC, Vrije Universiteit Amsterdam, Department of Epidemiology &
Biostatistics, Amsterdam Public Health, Netherlands*

Rachel Cooper, r.cooper@mmu.ac.uk

Department of Sport and Exercise Sciences, Manchester Metropolitan University, UK

Theodore D. Cosco, theodore_cosco@sfu.ca

Gerontology Research Centre, Simon Fraser University, Canada

Oxford Institute of Population Ageing, University of Oxford, United Kingdom

Martijn Huisman, ma.huisman@amsterdamumc.nl

VU Amsterdam, Department of Sociology, Netherlands

*Amsterdam UMC, Vrije Universiteit Amsterdam, Department of Epidemiology &
Biostatistics, Amsterdam Public Health, Netherlands*

Dorly J.H. Deeg, djh.deeg@vumc.nl

*Amsterdam UMC, Vrije Universiteit Amsterdam, Department of Epidemiology &
Biostatistics, Amsterdam Public Health, Netherlands*

Diana Kuh, d.kuh@ucl.ac.uk

MRC Unit for Lifelong Health and Ageing, UK

Mai Stafford, Mai.Stafford@health.org.uk

The Health Foundation, UK

Scientific understanding of the associations between socio-economic adversity and other domains such as health and psychosocial functioning may be improved by employing extensive, prospective life course data to model inter-individual heterogeneity in socio-economic trajectories. This study applied Latent Class Growth Analysis to derive a typology of trajectories of socio-economic adversity, and compared the psychosocial profiles of the groups based on this typology. Data were used from 2,950 men and women participating in the MRC National Survey of Health and Development in Great Britain, ascertained prospectively since birth

in 1946 until age 53. Trajectories of socio-economic adversity were based on indicators of occupational class, overcrowding, housing tenure, household amenities and financial hardship at ages 4, 11, 15, 36, 43 and 53, and education at age 26. Psychosocial factors included parental interest in education, self-management, neuroticism and attitudes towards social class and social mobility. Seven distinct trajectories were identified: persistent high; persistent low; strongly declining; gradually declining; increasing; early childhood; and relapsing high adversity. Key findings include that those with increasing adversity had high parental interest in education but low self-management and high neuroticism; that those with only early childhood adversity had a less favourable psychosocial profile than those with persistent low exposure; and that groups with declining adversity had relatively favourable attitudes towards education. Findings emphasise the need to consider socio-economic and personality mechanisms in the context of one another in order to better understand later life inequality.

key words social inequality • social mobility • cumulative advantage • personality • latent class analysis

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Introduction

Across disciplines such as sociology, epidemiology and developmental psychology, it is widely acknowledged that a life course perspective is crucial for understanding socio-economic inequalities in health and psychosocial functioning (Baltes, 1987; Dannefer, 2003; Kuh et al, 2003). However, in part due to the extensive data required to model socio-economic trajectories and examine their associations with other important domains such as psychosocial functioning and health, scientific understanding of these associations is still crude (Lynch, 2008). In this study, we aim to refine this understanding by providing, first, a typology of lifetime trajectories of socio-economic adversity based on data from a British birth cohort study, where ‘socio-economic adversity’ indicates the accumulation of disadvantage across material conditions and indicators of socio-economic position (SEP), and SEP refers to resource-based indicators such as education, occupational prestige and income (Krieger, 2001). We then apply this typology in a subsequent analysis that compares psychosocial profiles between groups with different trajectories of socio-economic adversity, based on factors observed in childhood and early adulthood.

Modelling trajectories of socio-economic adversity

Different theoretical models have been developed that guide empirical life course research on socio-economic inequality. In line with general principles of life course theory (Elder and Rockwell, 1979), these models focus on different patterns of duration and timing of exposure to socio-economic adversity, and their

potential consequences for domains such as psychosocial functioning and health. First, Cumulative Advantage/Disadvantage (CAD) posits that those who are born into families with socio-economic disadvantage tend to stay disadvantaged across the life course, and that this persistent exposure is accompanied by an accumulation of adverse exposures, including psychosocial risk factors (see, for example, Dannefer, 2003; and Hatch, 2005). The opposite applies to those born into a family with more advantaged socio-economic conditions, where 'rewards become resources that produce subsequent rewards' (DiPrete and Eirich, 2006: 283). Second, social mobility perspectives emphasise dynamic life course trajectories and focus on groups of individuals whose SEP increases or declines substantially during their lives (Blau, 1977). Third, sensitive period models posit that exposure to socio-economic adversity during a particular life stage may affect health more strongly than at other life stages (Ben-Shlomo and Kuh, 2002; Kuh et al, 2003).

In line with the variety of theoretical perspectives on socio-economic inequalities, lifetime exposure to socio-economic adversity has been operationalised in many ways, often depending on data availability. Some studies have compared groups made on the basis of combinations of parental and own SEP, examining differences in outcomes between stable high, stable low, and upwardly or downwardly mobile groups (see, for example, Broese van Groenou and van Tilburg, 2003; and Jonassaint et al, 2011), or additionally, a group of individuals who show no unidirectional pattern of mobility (Nilsson et al, 2005). Other studies have focused on accumulation of adversity by counting the number of measurement points in which a participant experienced adverse conditions (see, for example, Lynch et al, 1997), calculated an average of exposure across time points (Do, 2009), or examined all possible combinations of three indicators of socio-economic conditions (Popham and Mitchell, 2007).

In this study we extend this line of research by modelling exposure to socio-economic adversity across the life course, but we do not define possible trajectories a priori. Instead, we ask what are the most common types of trajectories of socio-economic adversity observed in the data. Given that individuals' socio-economic conditions may vary across the life course, we included six repeated measures. Moreover, we included measures of SEP (such as occupational class and education) as well as material deprivation (such as lack of household amenities), as these conditions reflect partly independent pathways to health and psychosocial outcomes (Lynch et al, 1994; Wilkinson, 1997; Geyer et al, 2006). We then apply this data-driven typology of trajectories of socio-economic adversity to examine associations between socio-economic conditions across the life course and psychosocial factors.

Links between socio-economic conditions and psychosocial factors

Research has shown that different indicators of socio-economic conditions are associated with psychosocial factors at different stages of the life course. For example, in studies of child and adolescent development, higher parental education and occupational class have been linked to higher parental involvement in the child's education, more adolescent self-control capabilities and higher emotional stability (neuroticism; Ashby and Schoon, 2010; Jonassaint et al, 2011; Moffitt et al, 2011). Self-management and emotional stability are characteristics that are often rewarded

in educational and occupational systems, and therefore predict higher later life SEP (Saunders, 1997; McCarron and Inkelas, 2006).

Additionally, socio-economic conditions in childhood are associated with people's expectations of their own development in domains such as education and working careers. Parents with higher SEP tend to prioritise the educational and occupational aspirations of their children, whereas those with lower SEP may be more ambivalent towards the importance of education, at least historically (Marks, 2003). One's social class may also shape attitudes towards social stratification, including ideas about differences between perceived social classes and expectations of social mobility (Britten, 1984), and in turn, such attitudes may influence subsequent educational attainment and adult wealth (Ashby and Schoon, 2010).

Building on this literature, we link multiple psychosocial factors observed in adolescence and early adulthood to lifetime exposure to socio-economic adversity, in order to increase understanding of the interplay between socio-economic conditions and psychosocial factors across the life course. We investigate two research questions:

- 1 What trajectories of socio-economic adversity can be distinguished in a post-war birth cohort followed over 53 years?
- 2 To what extent are these trajectories associated with psychosocial factors and attitudes towards social class and social mobility in childhood and early adulthood?

As the literature suggests that relationships between socio-economic adversity and psychosocial factors are bidirectional (Marks, 2003; Ashby and Schoon, 2010), we focus on psychosocial factors observed in the early and middle stages of the socio-economic trajectory.

Methods

Study sample

We used data from the Medical Research Council (MRC) National Survey of Health and Development (NSHD). This is a socially stratified sample of 5,362 singleton births that took place in March 1946 across England, Scotland and Wales. The sampling frame included all singleton births to women whose husband was in non-manual or agricultural occupations, and one in four single births to women with husbands in manual employment. Currently, the sample has been followed up 24 times across life (Wadsworth et al, 2006; Kuh et al, 2016). To model trajectories of socio-economic adversity, we used prospectively collected data from ages 4 to 53. We did not include SEP indicators beyond age 53; due to retirement a large proportion of the sample could no longer be categorised into a current occupational class at subsequent data collections. At age 53, $n = 3,035$ participants (56% of the original cohort) were successfully contacted, of whom $n = 2,984$ received a home visit from a trained nurse. Data on psychosocial factors hypothesised to be related to trajectories of socio-economic adversity were drawn from data collections from ages 4 to 26. Ethical approval for the data collection at age 53 was obtained from the UK Multicentre Research Ethics Committee. Written, informed consent has been provided by study members at all relevant data collections.

Measures

Socio-economic adversity

We selected indicators of material conditions and social status from childhood and adulthood that were available at multiple waves. We aimed to derive a measure of accumulation of adverse conditions at each wave. In order to construct such a measure, and because some measures were continuous whereas others were categorical, we dichotomised each socio-economic indicator as ‘adverse’ versus ‘not adverse’. Then, assuming equal weight for each condition, we counted the number of adverse conditions at each wave. These count variables were categorised into zero, one, or two or more adverse conditions. The subsequent trajectory analysis was based on these variables derived at ages 4, 11, 15, 36, 43 and 53.

From childhood, we included the following indicators: father’s occupational class, housing tenure, overcrowding and household amenities, each available at ages 4, 11 and 15. These indicators represent distinct dimensions of socio-economic adversity (occupational prestige, wealth and material conditions). For housing tenure, our definition of an adverse condition was based on the literature (Feinstein et al, 2007). For the other socio-economic conditions, cut-off points for adversity were chosen pragmatically, and were a balance between reflecting substantial adversity and achieving sufficient sample size with an adverse condition for the purposes of the analyses.

Occupational class was categorised using the Registrar General’s Social classification into six groups: I, professional; II, intermediate; III-N, skilled non-manual; III-M, skilled manual; IV, partly skilled manual; and V, unskilled. Unskilled or partly skilled manual (V and IV) were defined as adverse. For housing tenure, any other tenure than living in a house owned by parents, grandparents, relatives or the council was indicated as adverse. This included tenure in a private landlord-owned home, because these homes were often in worse conditions than the growing stock of newly built and more spacious council-owned homes (Feinstein et al, 2007). Overcrowding in childhood was defined as two or more individuals per room in the house. Lacking one or more amenities (running hot water, having an own bathroom, having an own kitchen) was indicated as an adverse condition.

From adulthood, we included the participant’s occupational class or spouse’s occupational class if that was higher, housing tenure, and self-reported financial hardship, available at ages 36, 43 and 53. Occupational class was categorised in the same way as in childhood. For housing tenure in adulthood, all categories except owning one’s house were indicated as adverse. Financial hardship was assessed by a question on the extent to which participants found it hard to manage as a family on their present income. We defined the response category ‘really quite hard to manage’ as adverse, and ‘fairly well’ and ‘comfortably’ as not adverse.

Furthermore, parental and own education were included as covariates in the analysis (Jung and Wickrama, 2008). These indicators of SEP co-determined the categorisation of individuals into groups with distinct trajectories of socio-economic adversity. Parental education (highest of both parents) was ascertained at age 6, and consisted of six categories, ranging from 0 (primary no diploma) to 5 (secondary or professional degree). Own educational level attained was ascertained at age 26, and was grouped into six categories ranging from 0 (none) to 5 (secondary or professional degree). Because 332 participants had missing data on parental and/or own education, and the trajectory models are calculated only for participants with complete data on covariates, we added ‘missing’ as a separate category to the education variables.

Furthermore, in order to include as many participants as possible while retaining acceptable proportions of missing data, we added the following inclusion criteria: valid data on at least three out of four childhood indicators at age 4; and complete socio-economic data at age 43. This latter age was chosen because n with complete data at age 43 was larger than at ages 36 and 53. The final sample consisted of $n = 2,950$ participants.

Childhood psychosocial factors

Higher parental interest in education may buffer the impact of childhood socio-economic disadvantage on educational attainment (Hango, 2007). We therefore included measures of parental interest in primary and secondary education. These were based on scales including several items measuring the frequency of parental visits to teachers and headmasters, and their attendance at parent–teacher association meetings (Douglas, 1964). These scales ranged from 0 to 50, with higher scores indicating more parental interest, and were derived at ages 10 and 13.

Measures related to ‘self-control’ in adolescents have been shown to be associated with wealth and health in adulthood (Moffitt et al, 2011). We included a measure of adolescent self-management at age 15. This was based on a previous factor analysis (Xu et al, 2013), and included teacher’s assessment of the participant’s attitude to work, concentration, neatness and daydreaming. The scale ranged from -2.68 to 1.84 , where a higher score indicates more self-management.

Early adulthood psychosocial factors

Neuroticism reflects individuals’ extent of emotional instability, defined as ‘a broad dimension of individual differences in the tendency to experience negative, distressing emotions and to possess associated behavioural and cognitive traits’ (Costa and McCrae, 1987: 301). Neuroticism tends to be higher with lower SEP, and higher scores have been linked to worse physical and mental health outcomes (Groffen et al, 2012). We included neuroticism at age 26, which was measured on a scale ranging from 0 to 12 with Eysenck’s short Maudsley Personality Inventory (Eysenck, 1958).

At age 26, participants answered a questionnaire about attitudes towards social class and social mobility. All participants were asked ‘Do you think your chances in life are better than your age peers?’ (coded as ‘better’ (1) versus ‘as good’ or ‘worse’ (0)). Participants were also asked to indicate what they would say are the classes in Britain today, and to put these classes in order, starting with the highest. If the interviewer assessed that the participant did not understand the question, denied class or had no picture of society, subsequent questions about social class and social mobility were skipped. Therefore, the rest of the questions about social class and social mobility were asked only to those who provided a satisfactory answer to the first question ($n = 1,890$).

These questions included: ‘How difficult would it be to move from one social class to another?’ (ranging from 0 to 4, treated as continuous and recoded such that higher scores reflect the perception that it is easier to move social class), ‘Would you like to change social class?’, ‘Do you feel closer to your own social class than to others?’, ‘What distinguishes social classes?’ and ‘How can you change social class?’ The answers to the latter two questions were open and have previously been categorised into several dichotomous items, including whether or not participants mentioned

the following aspects: money or material things, jobs, education and training, social origins, and social networks (Lowe, in Britten, 1984: 411).

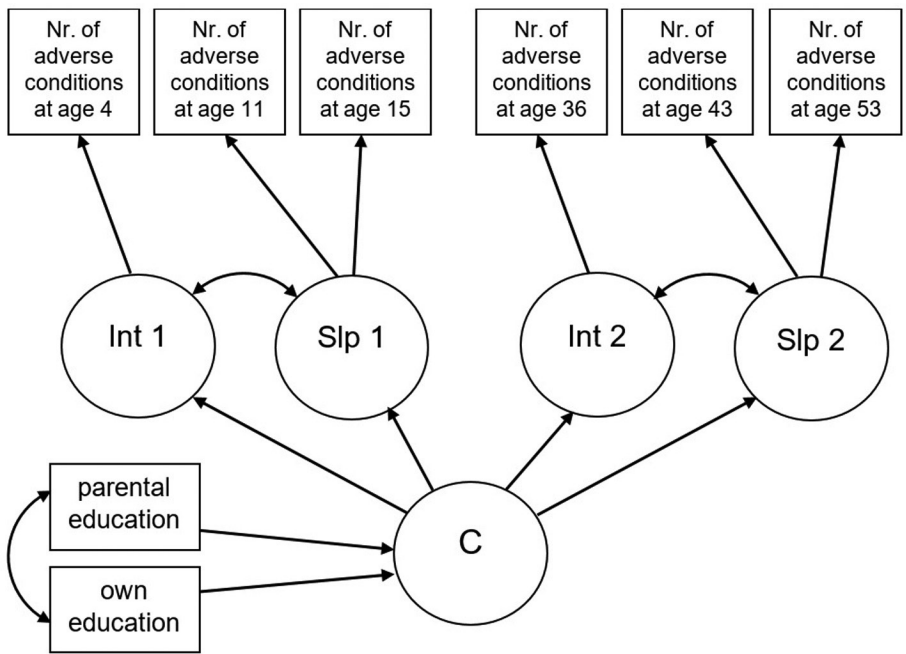
Control variables

After identification of the trajectories of socio-economic adversity, groups based on these trajectories were compared in terms of psychosocial characteristics and attitudes towards social class and social mobility. In these group comparisons we included gender and serious illness before age 25 as control variables. Illness reflected whether the participant had an illness for which at least a period of 28 days of hospital admission was required at least once before age 25. This was included with the aim of taking account of potential health selection that may confound the relationships between trajectories of socio-economic adversity and psychosocial factors.

Analytic procedure

We used Latent Class Growth Analysis (LCGA) in *Mplus* 7.0 to determine the number of subgroups with distinct types of trajectories of socio-economic adversity, based on the number of adverse conditions at six points in life (Figure 1). LCGA identifies subgroups of individuals with similar developments in specified observed variables over time, while accounting for the dependency of repeated measures within individuals. In LCGA, within-class variance is fixed to zero (Nagin, 1999), an assumption which was necessary to be able to estimate the model. Identification of subgroups is based on an algorithm maximising differences between and minimising

Figure 1: Piecewise Latent Class Growth Analysis. The observed variables ‘adversity age 4’ to ‘adversity age 53’ were categorical, expressing 0, 1 or 2+ adversities. C = latent Class; Int = Intercept; Slp = Linear Slope



differences within subgroups, using Maximum Likelihood estimation to account for missing data (Jung and Wickrama, 2008). For a similar approach to modelling socio-economic trajectories, see Stone et al (2008).

Because there were differences between the indicators used in childhood and adulthood, we used a piecewise model, calculating an intercept and slope separately for ages 4–15 and 36–53, but estimating a single latent class variable predicting both intercepts and slopes (Kim, 2014). The LCGA was weighted for the sampling design. In order to ensure robustness of the optimally fitting model, we used up to 600 random starting values.

The best fitting LCGA was identified in an iterative process. In each step, we increased the hypothesised number of classes by one, and compared the model fit to the previous model. We determined the optimal number of classes on the basis of multiple indicators: lowest sample size-adjusted Bayesian Information Criterion (BIC), acceptable entropy ($\geq .70$; the higher this statistic, the greater the certainty with which individuals can be classified in one particular class rather than another), Vuong-Long-Mendell-Rubin p -value (with values $< .05$ indicating significant improvement in model fit compared to a model with one class less), and no latent class with less than 5% of the sample ($n = 148$).

LCGA is a probabilistic method, meaning that latent class assignment typically involves some statistical uncertainty. Options to analyse associations between latent classes and exogenous variables while taking into account this uncertainty are becoming available in *Mplus* (for example, the DCAT and BCH methods; (Lanza et al, 2013; Asparouhov and Muthén, 2014)). However, because we used sample weights and wanted to include covariates in the secondary analysis, neither of these options were possible. Therefore, we adopted a ‘classify–analyse’ approach and exported individuals’ latent class probabilities and ‘most likely class’ to SPSS for further analysis.

In SPSS, we compared means and proportions of each psychosocial factor separately between the latent classes (maximum $n = 2,950$). Gender and illness adjusted weighted means and proportions were obtained using Analysis of COVariance for continuous factors and logistic regression for dichotomous factors. Statistical significance of differences between groups was obtained through linear regression or logistic regression. As the psychosocial factors were observed at different time points during the trajectories of socio-economic adversity, the goal of these analyses was to describe differences in psychosocial profiles rather than to ‘predict’ psychosocial factors from socio-economic conditions. We tested for sample selectivity by comparing the participants included in the trajectory analysis ($n = 2,950$) with those excluded at different ages, and by comparing those with a satisfactory answer to the first question about social classes ($n = 1,890$) with those with no satisfactory answer.

Results

Participants included in the main analyses were more likely to be female (49.8% versus 44.7%, $p < .001$), less likely to have experienced illness before age 25, more likely to have favourable household amenities and housing tenure in childhood, and more favourable socio-economic conditions in adulthood than participants excluded from the analyses. However, occupational class did not differ between the included and excluded groups. Within the included sample, those who had a clear idea about social class divisions and were asked the questions about attitudes towards

social class ($n = 1,890$) were more likely to have attained a higher educational level, had experienced higher parental interest in their secondary education, and lower neuroticism compared to those who were judged to provide an unsatisfactory answer to the introductory question about social class ($n = 748$).

Descriptive statistics of socio-economic conditions

At age four, 28.5% of the participants had a father in a low occupational class, 47.5% had adverse housing tenure, 21.0% lived in overcrowded homes, and 57.8% lived in homes that lacked one or more household amenities (Table 1; weighted percentages). On average, these circumstances improved substantially in the subsequent ten years; for example, at age four, 48.5% lived with two or more adverse conditions, whereas this was 21.7% at age 15. Own occupational class remained stable until age 53, whereas the percentages with adverse housing tenure and financial hardship declined; 50.0% lived with at least one adversity at age 36, and this percentage dropped to 37.6% at age 53.

Trajectories of socio-economic adversity

According to all statistical criteria, a model with seven latent classes provided the optimal fit for the Piecewise LCGA (Table 2). This model had the lowest BIC value, acceptable entropy, fitted significantly better than the six-class model (VLMR $p < .001$), and had an acceptable smallest class size (7.0% of the sample; $n = 207$). Moreover, the eight-class model provided worse fit, indicated by a higher BIC value and a VLMR p -value $> .05$. More detailed information on the selected model is provided in the supplement.²

We graphically depicted the seven trajectories on the basis of their members' probability of having *at least one* adverse condition at each wave, that is, the sum of probabilities of having 'one' or 'two or more' adverse conditions (Table 3; graph 1). We ordered the trajectories from high to low adversity in childhood, and labelled them as follows: Persistent High Adversity (weighted sample proportion: 8.3%); Relapsing High Adversity (10.5%); Strongly Decreasing Adversity (12.4%); Gradually Decreasing Adversity (30.0%); Adverse Early Childhood (7.0%); Increasing Adversity (8.9%); and Persistent Low Adversity (23.0%). Graphs showing trajectories of specific socio-economic conditions (such as housing tenure, overcrowding) in these groups are presented in Table 3 (graphs 2 to 8).

Psychosocial profiles

We found no statistically significant gender differences between the groups based on the trajectories (Table 4). The prevalence of serious illness before age 25 was highest in the Persistent High Adversity group (39.4%) and lowest in the Persistent Low Adversity group (26.8%). Parental interest in education, self-management and neuroticism varied significantly between the trajectories of socio-economic adversity. We found no significant differences in the percentage with a clear idea about the division of society into social classes. On average, money was mentioned as important for distinguishing social classes by two thirds of the sample, while jobs, education and social origins were mentioned by about a fifth of the participants. Money, jobs,

Table 1: Weighted descriptive statistics of socio-economic conditions in included participants ($n = 2,950$)

Variable	<i>N</i>	%	<i>N</i>	%	<i>N</i>	%
Childhood socio-economic adversity	Age 4		Age 11		Age 15	
Low father's social class	2,851	28.5	2,762	26.0	2,565	25.7
Adverse housing tenure	2,930	47.5	2,715	32.4	2,639	25.4
Overcrowding	2,942	21.0	2,704	13.7	2,649	9.4
Lacking household amenities	2,740	57.8	2,698	30.7	2,617	21.1
Number of adverse childhood conditions	2,950		2,710		2,644	
0	803	22.4	1,191	39.6	1,408	48.8
1	875	29.1	814	31.2	726	29.6
2 or more	1,272	48.5	705	29.2	510	21.7
Adulthood socio-economic adversity	Age 36		Age 43		Age 53	
Low own/spouse's social class	2,556	28.1	2,950	26.0	2,514	27.0
Adverse housing tenure	2,733	25.8	2,950	16.9	2,550	12.3
Financial hardship	2,709	19.4	2,950	13.2	2,552	11.1
Number of adverse adulthood conditions	2,529		2,950		2,509	
0	1,374	50.0	1,812	58.4	1,629	62.4
1	793	32.8	812	29.4	657	27.3
2 or more	362	17.2	326	12.2	223	10.3
Parental education (highest of father/mother)	Age 4					
	2,950					
Primary only	127	3.8				
Primary with or without additional diploma	1,760	69.5				
Secondary only	184	4.2				
Secondary with or without additional diploma	456	13.0				
Secondary with professional degree	223	3.9				
Missing data	190	5.6				
Own education	Age 26					
	2,950					
None or primary	1,035	41.5				
O levels	789	27.4				
A levels	724	20.8				
Degree or Higher	281	6.5				
Missing data	121	3.8				

Table 2: Latent Class Growth Model selection process

n classes	Sample size-adjusted BIC	Entropy	VLMR-statistic p -value	% in smallest class	Number of starting values
2	69,327	0.68	< .001	50.0	400
3	67,951	0.68	< .001	20.4	400
4	67,181	0.69	0.003	11.7	400
5	66,801	0.66	< .001	7.0	400
6	66,599	0.64	0.03	8.0	600
7 ^(a)	66,413	0.70	0.008	6.8	600
8	66,417	0.71	0.58	6.8	600

(a) This is the selected model

education and social networks were each mentioned by about a quarter to a third of participants as important for changing social class.

In the following, we describe psychosocial profiles of each of the seven groups identified with the LCGA. A summary is provided in [Table 5](#). Described differences between specific pairs of groups are significant at the $p < .05$ level, unless indicated otherwise.

Trajectory 1: Persistent High Adversity (8.3%)

This group was characterised by persistent high exposure to socio-economic adversity. In accordance with this, there was an accumulation of psychosocial risk factors (low parental interest in primary and secondary education, low adolescent self-management, high neuroticism).

On average, participants in this group thought that it was relatively difficult to change social class ($Mean M = 1.6$), and only 11.9% thought it was likely that they would change social class. At the same time, a low proportion (18.7%) – comparable to the Adverse Early Childhood and Persistent Low Adversity groups – reported that they would like to change social class. A high proportion reported that money distinguished social classes (80.9%), particularly in contrast to the Persistent Low Adversity group (64.3%). A high proportion also indicated money as being important for changing social class (43.6%). Furthermore, a low proportion indicated that education was important for distinguishing or changing social class (13.5% and 17.2% respectively). Despite the strong correspondence between their father's and own social class, few reported that social origins (12.5%) distinguished social classes, which was lower than in the Relapsing High Adversity group (21.6%; $p = .06$).

Trajectory 2: Relapsing High Adversity (10.5%)

Although housing conditions in childhood improved more than in other groups and parental occupational class was relatively high, the participants within this trajectory relapsed into high socio-economic adversity in adulthood. We observed a low level of self-management and a high level of neuroticism in this group. About a third attained some educational degree at age 26, which is more than twice as much as in the Persistent High Adversity group.

Nevertheless, despite the higher proportion with any education, an equally low percentage indicated education as important for distinguishing social classes or as a

Table 3: Results from the Latent Class Growth Analysis, and graphs of socio-economic conditions for each latent class^(a)

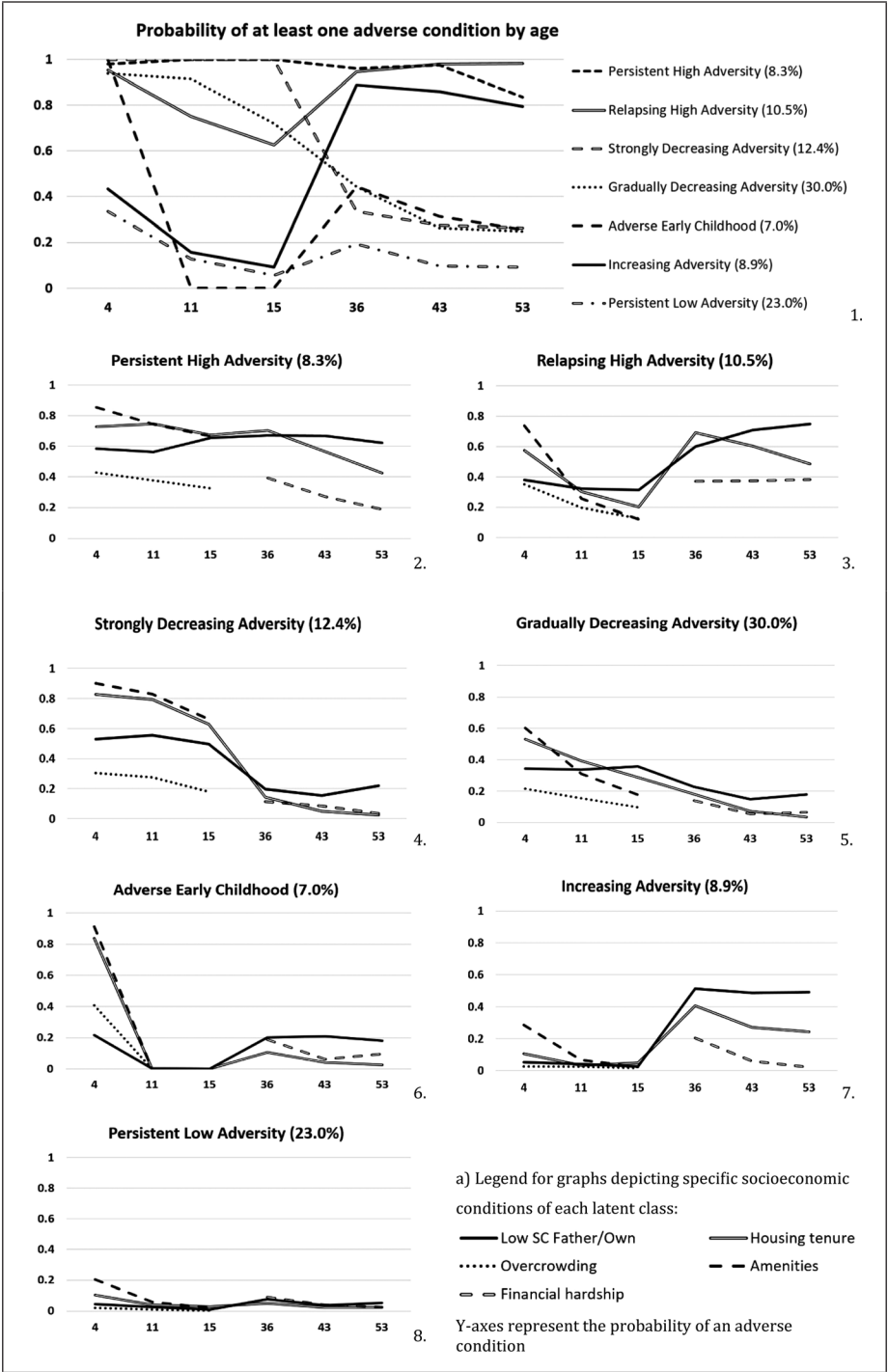


Table 4: Comparison of psychosocial factors and attitudes towards social class among seven trajectories of socio-economic adversity^(a)

Variable (range)	N	overall mean (SD)/%	adjusted and weighted means (se)/% for each socio-economic trajectory					p diff.		
			Pers. High	Relapsing	Strong Dec	Gradual Dec	Adv. Early		Increasing	Pers. Low
Female gender	2,950	49.7	53.7	51.0	48.8	49.5	45.5	49.8	49.8	.70
Serious illness before age 25	2,950	33.1	39.4	36.8	39.2	33.3	30.4	32.1	26.1	< .001
Childhood and adolescence; ages 4–15										
Parental interest primary education (0–50)	2,632	29.9 (13.8)	22.4 (0.92)	24.2 (0.85)	27.9 (0.75)	29.1 (0.47)	29.6 (0.94)	32.6 (0.84)	36.4 (0.48)	< .001
Parental interest secondary education (0–50)	2,173	22.6 (13.2)	15.6 (1.01)	17.7 (0.92)	19.2 (0.80)	23.1 (0.51)	22.7 (1.04)	24.3 (0.89)	28.5 (0.53)	< .001
Self-management (–3 to +2)	2,617	–0.02 (0.78)	–0.29 (0.06)	–0.31 (0.05)	–0.02 (0.04)	–0.01 (0.03)	0.08 (0.06)	–0.05 (0.05)	0.19 (0.03)	< .001
Early adulthood; age 26										
Neuroticism (0–12)	2,682	6.4 (3.8)	7.1 (0.27)	7.1 (0.25)	6.3 (0.22)	6.4 (0.13)	6.2 (0.28)	7.0 (0.24)	5.9 (0.13)	< .001
Attained at least some education (yes)	2,829	56.8	14.9	31.9	52.2	60.6	66.9	54.0	79.7	< .001
Attitudes towards social mobility										
Idea about social class divisions (yes)	2,638	71.5	67.5	71.0	75.7	67.0	76.2	74.6	74.3	.07
Chances better than age peers (yes)	2,675	17.8	6.2	8.5	15.6	16.7	19.8	20.8	26.7	< .001
How easy to change social class (0–4)	1,885	1.9 (0.93)	1.6 (0.08)	1.7 (0.07)	2.0 (0.06)	1.9 (0.04)	1.8 (0.08)	1.9 (0.07)	2.0 (0.04)	< .001
Would like to change social class (yes)	1,868	25.1	18.7	33.0	27.7	26.9	18.1	28.8	19.6	.002
Likely to change social class (yes)	1,885	14.0	11.9	12.9	18.4	14.5	10.2	17.8	10.9	.09
Feels close to own social class (yes)	1,860	34.8	32.6	31.5	35.7	32.7	34.9	31.8	39.6	.40
What distinguishes social classes?										
Money, material things (mentioned)	1,890	70.1	80.9	78.8	67.3	70.5	74.3	67.5	64.3	< .001
Job (mentioned)	1,890	18.3	13.2	18.4	20.4	19.7	13.6	19.7	16.9	.21

Table 4: Continued

Variable (range)	N	overall mean (SD)/%	adjusted and weighted means (se)/% for each socio-economic trajectory							p diff.
			Pers. High	Relapsing	Strong Dec	Gradual Dec	Adv. Early	Increasing	Pers. Low	
Education (mentioned)	1,890	21.5	13.5	10.2	21.5	24.9	21.6	18.4	25.8	<.001
Social origins (mentioned)	1,890	20.4	12.5	21.6	14.2	21.1	20.1	19.2	24.6	.007
<i>How can you change social class?</i>										
Money (mentioned)	1,890	33.7	43.6	28.9	36.8	31.6	32.2	42.5	30.2	.17
Job (mentioned)	1,890	25.9	20.4	21.8	31.2	25.8	25.2	23.0	28.0	.42
Education (mentioned)	1,890	27.7	17.2	20.5	22.6	29.4	27.3	21.5	36.0	<.001
Access to social networks (mentioned)	1,890	28.7	21.2	29.3	29.2	27.1	26.7	29.7	32.1	.05

(a) Means and percentages are weighted. Analyses are adjusted for gender and illness before age 25. Overall sample means are weighted but unadjusted. *p*-values and standard errors are unweighted but adjusted.

Table 5: Summary of psychosocial profile of the seven trajectories of socio-economic adversity.

Trajectory	Summary of profile
Persistent High Adversity 8.3% (n = 245)	<ul style="list-style-type: none"> •High probability of socio-economic adversity throughout the life course •Unfavourable psychosocial factors •Changing social class difficult, and did not expect to change •High percentage thought that money distinguished social classes •Low percentage thought that education distinguished social classes
Relapsing High Adversity 10.5% (n = 309)	<ul style="list-style-type: none"> •Adverse adulthood socio-economic conditions despite improvement in childhood •Characteristics similar to persistent high adversity group, but higher percentage with education •Persisting financial hardship in adulthood •High percentage wanted to change social class at age 26
Strongly Decreasing Adversity 12.4% (n = 365)	<ul style="list-style-type: none"> •Second worst conditions in childhood, but strong improvement after childhood •Childhood psychosocial factors relatively favourable despite childhood adversity •Thought it was relatively easy to change social class and relatively high percentage expected to do so
Gradually Decreasing Adversity 30.0% (n = 885)	<ul style="list-style-type: none"> •Relatively unfavourable socio-economic conditions in early childhood, but steady improvement •Average percentage obtained educational qualifications •Relatively high percentage indicated education as important for social class and social mobility
Adverse Early Childhood 7.0% (n = 206)	<ul style="list-style-type: none"> •Very unfavourable housing conditions at age 4, but no adversity at ages 11 and 15 •Relatively high self-management in adolescence •Less favourable childhood characteristics than persistent low adversity group despite similar conditions from age 11 onwards
Increasing Adversity 8.9% (n = 262)	<ul style="list-style-type: none"> •Shift to less advantaged socio-economic conditions between adulthood and childhood •Relatively high parental interest in education, but also high neuroticism •Relatively high percentages wanted to change social class, and expected to do so
Persistent Low Adversity 23.0% (n = 678)	<ul style="list-style-type: none"> •Low probability of socio-economic adversity throughout the life course •Favourable characteristics throughout the life course •High percentage felt close to own social class and thought they had better chances than their age peers •Distinctly high percentage indicated that education was important for changing social class

means to changing social class. About a third reported wanting to change social class (33.0%), and this percentage was about equal to that in the Strongly Decreasing, Gradually Decreasing and Increasing Adversity groups (27.7%, 26.9% and 28.8%, respectively). Furthermore, the lowest percentage (31.5%) felt close to their own social class, although differences with other groups were small.

Trajectory 3: Strongly Decreasing Adversity (12.4%)

This class showed a strong contrast between high adversity in childhood and low adversity in adulthood. The observed probability of experiencing financial hardship in adulthood was the lowest of all groups (Table 3, graph 4).

Although this group had a level of childhood adversity that was comparable to the Persistent High Adversity group, parental interest in education and self-management were higher. Furthermore, individuals in the Strongly Decreasing Adversity group thought it was easier to change social class than those in the Persistent High Adversity group ($M = 2.0$ versus $M = 1.6$), and a higher percentage thought that their chances were better than their age peers (15.6% versus 6.2%).

Although not statistically significantly different from other groups, the Strongly Decreasing Adversity group had the highest percentage indicating jobs as a way to change social class (31.2%), whereas the percentage indicating education as important for this was well below average (22.6%). The percentage attaining any education at age 26 was lower in the Strongly Decreasing Adversity group than in the Gradually Decreasing Adversity group (52.2% versus 60.6%). This might indicate that compared to the former group, upward social class mobility was more strongly related to job promotion than to attaining higher education.

Trajectory 4: Gradually Decreasing Adversity (30%)

This large group showed a gradual decrease in socio-economic adversity throughout the life course. The greatest decrease in the prevalence of adversity over time was observed for adverse housing tenure, which changed from 60% at age 4 to 0% at age 53. This group ended among the best positioned in terms of adulthood socio-economic conditions (Table 3, graph 5).

Parental interest in primary and secondary education was significantly higher in this group than in the Strongly Declining Adversity group. A relatively high percentage gained at least some educational qualifications at age 26 (60.6%), thought that education distinguished social classes (24.9%) and that education was a way to change social class (29.4%).

Trajectory 5: Adverse Early Childhood (7.0%)

The peak in adversity at age four in this group was related to poor housing conditions and overcrowding rather than to low paternal occupational class. By age 11, housing conditions were generally favourable for participants within this trajectory. Favourable conditions continued in adulthood, during which the likelihood of experiencing adverse socio-economic conditions was very low (Table 3, graph 6).

Despite the favourable socio-economic conditions that resembled those in the Persistent Low Adversity group from age 11 onwards, parental interest in primary and secondary

education and the percentage attaining education at age 26 were significantly lower than in that group. Regarding attitudes, there were some differences with the Persistent Low Adversity group. For example, those in the Adverse Early Childhood group thought it was more difficult to change social class ($M = 1.8$ versus $M = 2.0$), and a lower percentage thought that education was important for changing social class (27.3% versus 36%).

Trajectory 6: Increasing Adversity (8.9%)

In the Increasing Adversity group, socio-economic adversity in childhood was as low as in the Persistent Low Adversity group. However, the former group experienced more adverse conditions in adulthood. This shift was observed for occupational class as well as housing tenure (Table 3, graph 7). Moreover, compared to the Persistent Low Adversity group, a lower proportion in the Increasing Adversity group attained any educational qualifications by age 26 (54% versus 79.7%).

Consistent with the low level of adversity in childhood, parental interest in primary and secondary education was high. However, the level of self-management was significantly lower than in the Persistent Low Adversity group ($M = -0.05$ versus $M = 0.19$), and neuroticism at age 26 was higher ($M = 7.0$ versus $M = 5.9$), comparable to the level in the Persistent High and Relapsing High Adversity groups.

Nevertheless, the percentage that thought their chances were better than their peers was relatively high (20.8%), and only surpassed by the Persistent Low Adversity group (26.7%). At the same time, the percentage that wanted to change social class and the proportion expecting to change social class were relatively high (28.8% and 17.8%, respectively). Furthermore, the proportions thinking that money (42.5%), jobs (23.0%) and education (21.5%) were important for changing social class were comparable to those in the Persistent High Adversity group.

Trajectory 7: Persistent Low Adversity (23.0%)

This group had persistently low levels of adversity throughout life, and had distinctly favourable psychosocial characteristics.

At age 26, a high percentage felt that their chances were better than their peers (26.7%). Only 10.9% thought it likely that they would change social class, and a high percentage (39.6%) felt closer to their own social class than to others, although the differences with other groups were not statistically significant. Possibly reflecting their experiences so far, a relatively high percentage thought that education and social origins were what distinguishes social classes, and that education and access to social networks were ways through which one could change social class. Although it is conceivable that their financial position was more favourable than that of the other groups, the percentages indicating that money was important for distinguishing and changing social classes were relatively low (64.3% and 30.2% respectively).

Discussion

Using longitudinal and multidimensional data from a relatively large sample of individuals followed for 53 years since birth, this study identified seven distinct trajectories of socio-economic adversity. In this early post-war British birth cohort, we found that although most study members experienced some adverse socio-economic

circumstances in childhood, socio-economic adversity decreased across life for a large share of them. This is in line with the broader improvements in economic and material conditions and educational opportunities occurring from the 1950s onwards in the UK (Nunn et al, 2007). However, not everyone benefited from these improvements to the same degree; our analyses identified one group with persistent high adversity (8.3% of the sample) and one with strongly increasing adversity (8.9%). Furthermore, another group experienced substantial improvements in socio-economic conditions throughout childhood, but then relapsed into a high and stable level of adversity in adulthood (10.5%), and 7% of the sample was exposed to high socio-economic adversity in early childhood only, particularly to unfavourable housing conditions. Although limitations of the statistical models did not allow us to take full advantage of the detailed measures of socio-economic conditions present in our data set, our study demonstrated substantial and meaningful heterogeneity in individual trajectories of socio-economic adversity.

When applying the typology of socio-economic trajectories in subsequent analyses on psychosocial factors, a few observations stood out. First, parental interest in education and adolescent self-management in the adverse early childhood group were substantially lower than in the persistent low adversity group, and socio-economic adversity in adulthood was higher. At first glance, this observation might provide support to the sensitive period model (Ben-Shlomo and Kuh, 2002). However, it remains unclear how long a 'sensitive period' is supposed to last, and how one can distinguish this effect from accumulation effects. The same applies to our finding that the persistent and relapsing high adversity groups showed the lowest parental interest in primary as well as in secondary education. This might be interpreted as an accumulation of disadvantage or as exposure to a particular form of adversity during a sensitive period. We would conclude that given the evidence that parental involvement is important for later life SEP (Marks, 2003; Ashby and Schoon, 2010), both mechanisms partly apply.

Second, the group who experienced a marked increase in socio-economic adversity despite favourable childhood socio-economic conditions had a high level of parental interest in education, but a relatively low level of self-management and high neuroticism. These results are in line with previous research showing that personality characteristics such as conscientiousness and neuroticism may affect occupational and relational success independent of parental SEP (Ozer and Benet-Martínez, 2006; Roberts et al, 2007). As evidence accumulates that personality characteristics are malleable, particularly in early life (Caspi and Roberts, 2001), this suggests that both childhood socio-economic conditions and personality development warrant attention in interventions that aim to tackle excessive socio-economic inequality across the life course.

Third, we found associations between trajectories of socio-economic adversity and attitudes towards social class and social mobility at age 26 that were mostly, but not always, in line with expectations. An expected observation was that the groups with highly dynamic trajectories most often indicated that they would like to change social class. Additionally, those with more adverse socio-economic trajectories were less likely to think that their life chances were better than their age peers and less likely to indicate education as important for distinguishing social classes and social mobility. The rejection of education, of central importance to life chances in those with more socio-economic adversity, may be specific to this cohort and may be

weakening in more recent cohorts, as Western economies have transitioned from being production to information driven (Marks, 2003). Nevertheless, our results are in line with previous findings showing that such attitudes are associated with reduced investment in education and working careers, and with persistence of socio-economic adversity across life (Ashby and Schoon, 2010).

One example of a discrepancy between trajectory and attitudes was found in those with a relapsing high adversity trajectory. Despite the observations that a relatively high proportion wanted to change social class, expected to change and did have an educational qualification, they had the highest proportion with a low occupational class in late adulthood. This raises the question, possibly to be addressed in future studies, whether holding unrealised ambitions is associated with worse outcomes in terms of health and well-being in later life than experiencing persistent high socio-economic adversity without having such ambitions.

Another apparent discrepancy between trajectory and attitude was found in those with persistent high adversity, of whom an unexpectedly low percentage wanted to change social class. At first glance, this might be taken to reflect resignation to one's adverse socio-economic conditions. However, these attitudinal data were collected in 1972, when a substantial proportion of jobs in Britain were still in manual occupations and trade unions were strong (Halsey, 2000). The low proportion wanting to change social class in the persistent high adversity group may thus also reflect working-class pride (Marks, 2003). This highlights that our findings on attitudes towards social class should be interpreted in light of wider societal mechanisms shaping social stratification.

Although we used the CAD, social mobility and sensitive period models as a guide for our analysis and for interpreting the results, complexities involved in empirically distinguishing these models and testing their hypotheses have been noted (Ben-Shlomo et al, 2016). We argue that these complexities do not make the hypotheses following from these models invalid, but merely difficult to test. One way of addressing them would be to have more frequent measurements of socio-economic adversity and the outcomes of interest (such as self-management) across the life course. Although this was beyond the scope of our current study, the results illustrate that duration and timing of exposure to socio-economic adversity is reflected in particular psychosocial characteristics and attitudes towards social stratification.

Strengths and limitations

The main strength of this study was the reduction of longitudinal, prospective data on multiple indicators of SEP to a meaningful and manageable typology of trajectories of socio-economic adversity. Moreover, inclusion of multiple psychosocial factors enabled a detailed description of these groups in terms of psychosocial characteristics. Demonstrating consistencies as well as discrepancies between trajectories and psychosocial factors measured at different time points during childhood, adolescence and early adulthood provided insights into the ways in which socio-economic conditions and psychosocial factors are interrelated across the life course.

A few limitations of this study should be mentioned. First, for a number of reasons we had to reduce data and model complexity in order to successfully run the trajectory analysis, thereby capturing less individual heterogeneity than may have been possible without such constraints. Additionally, adjustment for classification uncertainty was not possible. The most likely implication of this is that associations between socio-economic

trajectories have been underestimated (Lanza et al, 2013). Second, our categorisation of socio-economic conditions cannot fully acknowledge that associations between socio-economic conditions and other domains often follow a gradient. Nevertheless, the sum score of adverse conditions captured accumulation of clearly adverse conditions, and changes therein over time, which still allows for substantial between and within-person variability. Third, because the psychosocial factors were measured during rather than after or before the trajectory of socio-economic adversity, demonstrating causal consequences of the trajectories and their interactions with psychosocial factors for outcomes such as health constitute an important topic to be addressed in future studies. Finally, analyses of selection effects due to sample attrition and missing data showed that, particularly at higher ages, those with adverse socio-economic conditions were under-represented. Although the NSHD sample remained generally comparable to characteristics of census data (Wadsworth et al, 2003) and our sample was still large and contained much individual variation, this implies that the size of groups with adverse socio-economic trajectories and socio-economic disparities in attitudes towards social class could have been underestimated.

Conclusion

There is much variation in individual trajectories of socio-economic adversity, which includes stability, strong increases or decreases, short-term exposure, and relapse in socio-economic adversity. We found many differences in psychosocial factors observed in childhood and early adulthood between the groups based on the trajectories. These differences suggest that socio-economic conditions and personal behavioural and attitudinal dispositions are interrelated mechanisms shaping development and inequality across the life course. In accordance with recent directions in psychological science (Roberts et al, 2007), our findings emphasise the need to consider these mechanisms in the context of one another in order to better understand later life inequality.

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Notes

¹ Corresponding author, telephone: +31(0)20-4446012.

² For the supplement, see <https://figshare.com/s/53fdf54f523ed5ac8eb2>.

Conflicts of interest

The authors declare that there is no conflict of interest.

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